

## forAM 939<sup>®</sup> 15-45 VG

### Advanced nickel superalloy for Additive Manufacturing

**forAM 939 VG** is a vacuum induction melted, argon gas atomized, and spherical powder for additive manufacturing. The strengthening mechanism is a combination of precipitation hardening of gamma prime phases (Ni<sub>3</sub> (Al, Ti)) phases and the carbides, also solid solution strengthening. With a service temperature of up to 700°C and a good balance of mechanical properties, like fatigue and creep is the forAM 939 a good candidate for high temperature applications like aerospace and land-based gas turbine components with high service temperatures.

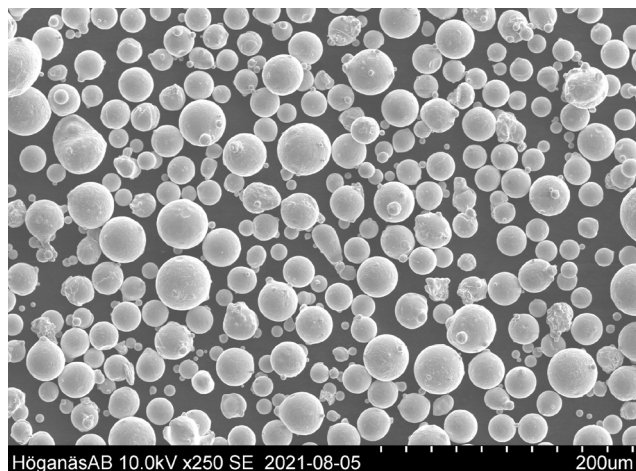
#### Equivalent materials:

» Ni-SA 939LC

**For more information on forAM product line and other of Höganäs products, please contact your local sales representative.**

## Powder properties

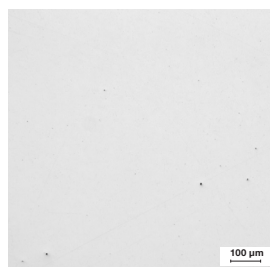
Chemical composition, (typical values)	
Element	Content, %
Cr	22
Co	19
Ti	4
Al	2
C	<0.2
Nb	1
Ta	1.4
W	1.9
Ni	Balance



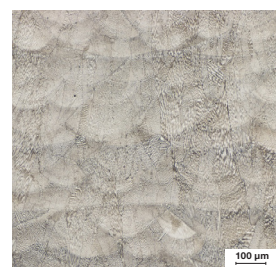
Typical powder properties		
Nominal particle range	15-45 µm (max 5% over and under size)	MPIF05, ASTM B214, ISO4497
Hall flow	15 s/50 g	MPIF03, ASTM B213, ISO4490
Apparent density	4.1 g/cm <sup>3</sup>	MPIF04, ASTM B212, ISO3923/1

## Mechanical properties

Surface condition is machined		
Heat treatment	As Printed <sup>(1)</sup>	Heat treated <sup>(2)</sup>
Printed in Z-direction – Build direction		
UTS (MPa)	1,080	1,380
YS (MPa)	710	910
Elongation (%)	32	20
IE Notch in Y direction (J)	72	27

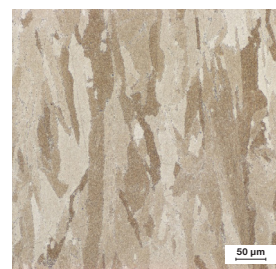


As polished



As printed - Build direction

Heat treatment	As Printed <sup>(1)</sup>	Heat treated <sup>(2)</sup>
Printed in X/Y-direction – Perpendicular		
UTS (MPa)	1,150	1,415
YS (MPa)	850	945
Elongation (%)	28	21
IE Notch in Z direction (J)	64	19
Hardness (HV10)	350	420



Heat Treated – Build direction

(1) No heat treatment

(2) Solutionized at 1,190°C for 4h followed by fast cooling. Aged at 1,000°C for 6h followed by fast cooling. Aged at 800°C for 4h cooled in still Ar to 300°C followed by forced cooling.

## Standard packaging:

30 kg (6x5 kg, 2.5 L PE bottles packed in cardboard box)

200 kg / 500 kg Flexbag

(Other tailored particle sizes and packaging are available under conditions)